CLAIMS

1. A method for defining a boundary separating a first region and a second region of a digital image, the digital image including one or more color arrangements characteristic of the first region and one or more color arrangements characteristic of the second region, the method comprising:

determining using a learning machine, based on one or more of the color arrangements, which pixels of the image satisfy criteria for classification as associated with the first region;

determining using a learning machine, based on one or more of the color arrangements, which pixels of the image satisfy criteria for classification as associated with the second region;

identifying pixels of the image that are determined not to satisfy the criteria for classification as being associated either with the first region or the second region; and

decontaminating the identified pixels to define a boundary between the first and second regions.

2. The method of claim 1, wherein a pixel being considered by the learning machine is associated with a corresponding neighborhood of pixels, the method further comprising:

providing to the learning machine input information specifying a color arrangement of the corresponding neighborhood of pixels, wherein the learning machine is configured to classify the pixel being considered, based on the color arrangements of the corresponding neighborhood of pixels, as either associated with the first region or with the second region.

3. The method of claim 2, wherein:

a color arrangement represents a visual texture.

4. The method of claim 2, wherein:

the learning machine is a support vector machine.

5. The method of claim 2, wherein:

the learning machine is a neural network.

6. The method of claim 2, wherein:

the learning machine is configured to provide an output classifying the pixel being considered, the output indicating a probability of the pixel being associated with the first region and a probability of the pixel being associated with the second region.

7. The method of claim 6, wherein:

the output is a floating point number between a lower number and an upper number, the lower number indicating a one-hundred percent probability of the pixel being associated with the second region, and the upper number indicating a one-hundred percent probability of the pixel being associated with the first region.

8. The method of claim 7, wherein:

the lower number is –1 and the upper number is 1.

9. The method of claim 7, further comprising:

converting the floating point number to an integer between a first integer and a second integer, the first integer indicating a one-hundred percent probability of the pixel being associated with the second region, and the second integer indicating a one-hundred percent probability of the pixel being associated with the first region.

10. The method of claim 9, wherein:

the first integer is 0 and the second integer is 255.

11. The method of claim 9, wherein:

the criteria for classification as associated with the first region includes having an integer that exceeds a first threshold; and

the criteria for classification as associated with the second region includes having an integer that is less than a second threshold.

12. The method of claim 11, wherein:

the first threshold is 170 and the second threshold is 85.

13. The method of claim 1, further comprising:

training the learning machine to classify pixels.

14. The method of claim 13, wherein training includes:

selecting, based on user input, a training set of pixels used to train the neural network.

15. The method of claim 14, wherein:

the training set of pixels selected includes pixels located within a particular range of the boundary.

16. The method of claim 15, wherein:

the particular range is 20 pixels from either side of the boundary.

17. The method of claim 1, wherein:

the neighborhood of pixels is one of a three-by-three square of pixels, a five-by-five square of pixels, and a seven-by-seven square of pixels.

18. The method of claim 17, wherein:

the pixel being considered is located at a center of the neighborhood of pixels.

19. The method of claim 1, wherein:

the learning machine is a neural network;

the neural network includes hidden nodes and gating nodes; and

a gating node is associated with a corresponding hidden node, the gating node being configured to determine, based on a location of a pixel of being considered, a contribution the corresponding hidden node makes to an output of the neural network.

20. The method of claim 1, further comprising:

constructing from the identified pixels a boundary mask that indicates which pixels of the digital image are the identified pixels.

21. The method of claim 1, wherein decontaminating produces an opacity mask, the method further comprising:

constructing from the identified pixels a probability mask; and

combining the opacity mask and the probability mask.

22. The method of claim 21, wherein:

combining the opacity mask and the probability mask includes multiplying the opacity mask with the probability mask.

23. The method of claim 1, wherein the first region is a foreground of the image and the second region is a background of the image, and decontaminating includes:

excluding from the identified pixels a pixel that has no foreground colors; and

changing colors of a pixel that includes both foreground and background colors so that the changed identified pixels include only foreground colors.

24. A method for defining a boundary separating a first region and a second region of a digital image, the method comprising:

determining based on an output of a neural network which pixels of the image satisfy criteria for classification as associated with the first region; and

determining based on an output of the neural network which pixels of the image satisfy criteria for classification as associated with the second region, wherein the neural network includes a gating node associated with a corresponding hidden node, the gating node being configured to determine, based on a location of a pixel being considered, a contribution the corresponding hidden node makes to an output of the neural network.

25. The method of claim 24, wherein the pixel being considered is associated with a corresponding neighborhood of pixels that exhibits a color arrangement, the method further

comprising:

providing to the neural network input information specifying the location of the pixel being considered and the color arrangement of the corresponding neighborhood of pixels, the neural network being configured to provide an output indicating a probability that the pixel being considered is associated with the first region and a probability that the pixel being considered is associated with the second region.

26. The method of claim 25, wherein:

the neighborhood of pixels is one of a three-by-three square of pixels, a five-by-five square of pixels, and a seven-by-seven square of pixels; and

the pixel being considered is located at the center of the square of pixels.

27. The method of claim 24, further comprising:

training the gating node to determine, based on the location of the pixel of being considered, a contribution the hidden node makes to an output of the neural network.

28. The method of claim 27, further comprising:

training the hidden nodes to classify pixels as either associated with the first region or associated with the second region, wherein the training of the hidden nodes occurs during the training of the gating nodes.

29. The method of claim 24, wherein the neural network includes:

input nodes configured to receive input information specifying the location of the pixel being considered and to provide the input information to the gating node.

30. The method of claim 24, wherein the neural network includes:

input nodes configured to receive input information specifying the color arrangement of the corresponding neighborhood of pixels and to provide the input information to the corresponding hidden node.

31. A computer program product, tangibly stored on machine readable medium, for segmenting a first region and a second region, each region including one or more color arrangements that are characteristic of the region, the product comprising instructions operable to cause a processor to:

determine based on one or more of the color arrangements which pixels of the image satisfy criteria for classification as associated with the first region;

determine based on one or more of the color arrangements which pixels of the image satisfy criteria for classification as associated with the second region;

identify pixels of the image that are determined not to satisfy the criteria for classification as being located either in the first region or the second region; and

decontaminate the identified pixels to define the boundary.

32. A computer program product, tangibly stored on machine readable medium, for segmenting a first region and a second region, each region including one or more color arrangements that are characteristic of the region, the product comprising instructions operable to cause a processor to:

receive an input that selects a portion of the first region and an input that selects a portion of the second region;

identify pixels, based on the inputs and the color arrangements of the first and second regions, located in the first region; and

identify pixels, based on the inputs and the color arrangements of the first and second regions, located in the second region.